Universidad
Carlos III de Madrid

COURSE: Extension of Physics		
DEGREE: Industrial Techniques Engineering	1st YEAR	2nd SEMESTER

COURSE'S SCHEDULE

WEEK	SESSION	LECTURE CONTENT DESCRIPTION	GROUP (Check X)		Group	Special room for session (*)	STUDENT WEEKLY TASKS		
			Lectures	Seminars			DESCRIPTION	CLASS HOURS	WORK HOURS Week Maximum 7 H
1	1	**Presentation.** **Kinematics of a particle** Vectors position, velocity and acceleration Equation of trajectory Intrinsic components of acceleration Circular motion	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	5
1	2			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
2	3	**Relative motion** Systems of reference Transformations among systems of reference Applications	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	5
2	4			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
3	5	**Dynamics of a particle** Fundamental concepts: mass, linear moment and forces Newton's laws Examples of forces: weight, elastic force, centripetal force Angular moment and moment of forces	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	4

3	6			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
4	7	**Conservative and non-conservative forces. Work and energy.** Scalar and vector fields. Gradient and curl. Conservative fields. Potential function. Work. Power. Kinetic energy Conservative forces and potential energy Non-conservative forces.	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	4
4	8			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
5	9	**Systems of particles** Internal and external forces. Statics. General condition of equilibrium. Motion of the center of masses. Kinetic energy of a system of particles. Conservation theorems for a system of particles	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	6
5	10			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
6	11	**Kinematics of the Rigid Body** Rotation and translation motion. Motion of the rigid body in the plane. Moment of inertia. Theorem of Steiner	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	4
6	12			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
7	13	**Dynamics of the Rigid Body** Equations of motion of the rigid body Rotation work and power. Kinetic energy of rotation	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	6
7	14			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
8	15	**Introduction to Thermodynamics** Thermodynamics: concept and definitions. Equilibrium States. Quasistatic processes and reversible	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	6

		processes. Work							
8	16			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
9	17	**Temperature. Ideal gases** Definition of temperature Thermometry. Ideal gas scale Thermal coefficients: expansion and isotherm compressibility	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	4
9	18			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
10	19	**First principle** Experiment of Joule and statement of Helmholtz. Internal energy; energy equation of state. Heat. Heat capacities and specific heats. Heat and work sources. Phase Changes Application to ideal gases. Diagrams PV and PT	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	3
10	20			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
11	21	**Second principle** Statement of Kelvin-Planck. Thermal engines. Statement of Clausius. Refrigerating machines. Irreversibility. Cycle of Carnot. Theorem of Carnot. Consequences Cycles with ideal gases.	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	3
11	22			X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
12	23	**Entropy** Theorem of Clausius. Entropy Diagrams T-S. Entropy in ideal gases. Entropy in irreversible processes. Entropy balance.	X				- Comprehensive reading of the proposed references. - Individual study of the lesson, ensuring to became familiar with the new concepts and possibly searching additional information.	1,5	6
12	24			X			Solution of proposed exercises.	1,5	

							Presentation of works and problems. Participation in debates and discussions. Evaluation		
14	28				X			Solution of proposed exercises. Presentation of works and problems. Participation in debates and discussions. Evaluation	1,5	
SUBTOTAL									**42 + 68 = 110**
15		Tutorials							2	2
16-18		Assessment							3	15
TOTAL									**132**

(*) Evaluations and/or exams can be done during seminars at any time.

LABORATORY SESSIONS						
SESSION	**WEEK**	**DESCRIPTION**	**ROOM**	**WEEKLY PROGRAMMING FOR STUDENT**		
				DESCRIPTION	**CLASS HOURS**	**HOMEWORK HOURS Maximum 7 H**
1		Lab. Practice nº 1	4SB01-03	Read guideline document. Acquire Data. Analyze results. Prepare report.	1,5	3
2		Lab Practice nº 2	4SB01-03	Read guideline document. Acquire Data. Analyze results. Prepare report.	1,5	3
3		Lab Practice nº 3	4SB01-03	Read guideline document. Acquire Data. Analyze results. Prepare report.	1,5	3
4		Lab Practice nº4	4SB01-03	Read guideline document. Acquire Data. Analyze results. Prepare report.	1,5	3
TOTAL						18